

WILLKIE FARR & GALLAGHER

March 2, 1999

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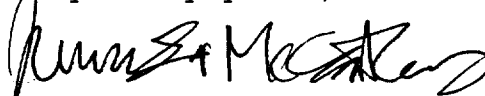
Re: ET Docket No. 98-206, RM-9147 and RM-9245

Dear Ms. Salas:

Please find attached a diskette copy of the Comments of Loral Space & Communications Ltd., filed today in the above-referenced docket. The diskette is formatted in an IBM compatible form using WordPerfect 5.1 software and is being submitted in "read only" mode.

Should you have any questions, please do not hesitate to contact me.

Very truly yours,



Jennifer D. McCarthy

Attachment: diskette

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BEFORE THE
Federal Communications Commission
WASHINGTON, D.C.

In the Matter of

Amendment of Parts 2 and 25 of the Commission's
Rules to Permit Operation of NGSO FSS Systems
Co-Frequency with GSO and Terrestrial Systems
in the Ku-Band Frequency Range and

Amendment of the Commission's Rules to Authorize
Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band
by Direct Broadcast Satellite Licensees and Their
Affiliates

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) ET Docket No. 98-206
) RM-9147
) RM-9245
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FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF THE SECRETARY

COMMENTS OF LORAL SPACE & COMMUNICATIONS LTD.

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March 2, 1999

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SUMMARY

Loral Space & Communications Ltd. ("Loral") supports the Commission's proposal to permit NGSO FSS operations in certain segments of the Ku-band. Because Loral holds an investment in SkyBridge, an applicant to operate an NGSO system in the Ku-band, as well as ownership interests in U.S. GSO FSS operators Loral SpaceCom Corporation d/b/a Skynet, Loral Orion, and is majority owner and manager of CyberStar, Loral is uniquely situated to comment on the feasibility of sharing between NGSO FSS and GSO FSS operations in the Ku-band.

The NPRM proposes rules for NGSO FSS/GSO FSS sharing that incorporate the provisional equivalent power flux density ("epfd") and aggregate power flux density limits ("apfd") adopted at the 1997 World Radiocommunication Conference ("WRC-97"). Loral submits that the Commission should not adopt the WRC-97 provisional limits at this time. Since WRC-97, study group Joint Task Group 4-9-11 and Working Party 4A have made significant progress toward developing a set of epfd and apfd limits that will be considered at WRC-2000. However, the study groups' work is ongoing and many critical issues remain to be resolved. The Commission must carefully consider the final conclusions of the study groups before adopting specific technical rules on NGSO FSS/GSO FSS sharing.

However, the Commission can and should adopt service rules and certain technical rules on which or about which consensus has already been achieved. Loral believes that, subject to the qualifications contained in these Comments, the Commission should permit NGSO FSS gateway downlink operations in the 10.7-11.7 GHz band and NGSO FSS gateway uplink operations in the 12.75-13.25 GHz, 13.8-14.0 GHz, and 14.4-14.5 GHz bands. Similarly, the Commission should allow NGSO FSS service downlink operations in the 11.7-12.2 GHz and 12.2-12.7 GHz bands

and NGSO FSS service uplink operations in the 14.0-14.4 GHz and 14.4-14.5 GHz bands.

NGSO FSS system operators should be subject to the same geographic coverage rules imposed on other NGSO systems providing global coverage.

Loral supports the Commission's proposal to eliminate the international system only requirements for GSO FSS downlink operations in the 10.7-11.7 GHz band and for GSO FSS uplink operations in the 12.75-13.25 GHz band. By permitting domestic GSO operations at these frequencies, the Commission would enhance the network productivity of these GSO FSS operations and maximize use of scarce Ku-band spectrum.

BEFORE THE
Federal Communications Commission
WASHINGTON, D.C.

In the Matter of)	
)	
Amendment of Parts 2 and 25 of the Commission's)	
Rules to Permit Operation of NGSO FSS Systems)	ET Docket No. 98-206;
Co-Frequency with GSO and Terrestrial Systems)	RM-9147
in the Ku-Band Frequency Range and)	RM-9245
)	
Amendment of the Commission's Rules to Authorize)	
Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band)	
by Direct Broadcast Satellite Licensees and Their)	
Affiliates)	

COMMENTS OF LORAL SPACE & COMMUNICATIONS LTD.

Loral Space & Communications Ltd. submits its comments in the above-referenced proceeding.¹

I. INTRODUCTION

Loral supports the efficient use of radio frequency spectrum and believes that NGSO FSS operations represent an innovative means to share scarce Ku-band spectrum.² However, NGSO FSS systems operating in the congested Ku-band must avoid causing unacceptable interference

¹ Amendment of Parts 2 and 25 of the Commission's Rules to Permit Operation of NGSO FSS Systems Co-Frequency with GSO and Terrestrial Systems in the Ku-Band Frequency Range and Amendment of the Commission's Rules to Authorize Subsidiary Terrestrial Use of the 12.2-12.7 GHz Band by Direct Broadcast Satellite Licensees and Their Affiliates, Notice of Proposed Rulemaking (rel. Nov. 24, 1998)("NPRM").

² Loral holds an investment in SkyBridge, is the majority owner and manager of CyberStar and owns U.S. GSO FSS system operators Loral SpaceCom Corporation d/b/a Skynet and Loral Orion. A joint venture comprised of Loral Space & Communications Ltd. and Telefonica Autrey, S.A. de C.V. owns 75% of the outstanding capital stock of SatMex, a Mexican-licensed GSO FSS operator.

into existing GSO systems and should not unduly constrain future growth of these services. Any rules adopted by the FCC in this rulemaking should further these objectives.

The 1997 ITU World Radiocommunication Conference ("WRC-97") adopted provisional equivalent power flux-density ("epfd") and provisional aggregate power flux density ("apfd") limits for the downlink and uplink respectively for NGSO systems operating in the Ku- and Ka-bands. These limits were deemed provisional until they could be reviewed by WRC-2000 based upon the technical analysis carried out by the International Telecommunication Union Radiocommunications Sector ("ITU-R") study groups. The NPRM recognizes that the WRC-97 limits could be revised at WRC-2000 and yet proposes rules for NGSO/GSO sharing which incorporate the WRC-97 limits.

Loral has participated in and contributed to the comprehensive work accomplished since WRC-97 by the ITU-R study group process, through participation in Joint Task Group ("JTG") 4-9-11 and Working Party 4A ("WP4A"). These groups have worked efficiently and fairly to address a host of issues relevant to this proceeding. Loral also supports the ongoing work of these groups and believes that the study group process will lead to a set of limits that will allow co-existence between NGSO and GSO systems. While there has been substantial progress, the work of the study groups is ongoing and there are many critical issues yet to be resolved. The Commission should ensure that it does not, in this rulemaking, prematurely promulgate regulations and adopt epfd and apfd limits that might ultimately be inconsistent with the recommendations of the relevant study groups and regulations adopted at WRC-2000.

NGSO FSS systems require uniform, global operating parameters. While the Commission has the responsibility and the authority to adopt rules in the United States, Loral requests that the Commission refrain from imposing specific technical rules on NGSO FSS/GSO FSS sharing until

it carefully considers the final conclusions of the study groups regarding the many outstanding issues to be resolved in this process. The Commission should, of course, proceed to adopt non-technical rules, such as service rules, for which a complete record will be developed in this proceeding.

The provisional epfd and apfd limits adopted at WRC-97, which the FCC proposes to adopt in this NPRM, were defined without the benefit of information being developed in the ITU study group process. Accordingly, these limits should not be adopted until the study group process concludes. Specifically:

- Analyses have demonstrated that the method of aggregating the effects of multiple NGSO systems is different for "long-term effects" and "short-term effects." There are three zones in the epfd distribution curves: (1) "Zone A," which represents the long-term effects (i.e., where the percentage of time the epfd may be exceeded is relatively large) where the interference powers from the NGSO systems add in power, (2) "Zone B," which represents shorter-term effects (i.e., where the percentage of time the epfd may be exceeded is lower than those for Zone A) where the interference powers do not add but the unavailability time contributions of the different NGSO systems add in time, and (3) "Zone C," which represents the shortest-term effects where neither power addition nor time addition takes place but the interference into the GSO system is dominated by the worst-interfering NGSO system. Additional work is needed to determine the boundaries between these zones and how these boundaries should be taken into account in determining the aggregate interference.
- Analysis is still being performed in the study groups to derive the appropriate single-entry limits, taking into account the effects of multiple NGSO systems, to be considered at WRC-2000.
- There is work underway to define epfd limits as a continuous function (epfd mask) of the percentage of time not exceeded for specific antenna sizes. Loral agrees with the conclusions of JTG 4-9-11 that continuous curves of epfd should be developed.

Considering the progress that has been made and the short time that the study groups have to complete their work, Loral urges the Commission to refrain from adopting final operational limits

related to issues that are still under study until it can consider the recommendations and analyses of the study groups.

II. NGSO FSS GATEWAY BANDS

The NPRM proposes to allow NGSO FSS gateway downlink operations on a co-primary basis in the 10.7-11.7 GHz band and NGSO FSS gateway uplink operations on a co-primary basis in the 12.75-13.25 GHz, 13.8-14.0 GHz and 14.4-14.5 GHz bands.³ The NPRM also proposes to adopt the spectrum sharing criteria developed at WRC-97 to facilitate frequency sharing between NGSO and GSO systems in these various segments.⁴ Loral supports such use subject to the technical qualifications set forth below.

A. NGSO Gateway Downlink Band (10.7-11.7 GHz)

The NPRM proposes to permit NGSO FSS gateway downlink operations in the 10.7-11.7 GHz band and to amend footnote NG104 of the Table of Frequency Allocations to permit domestic NGSO FSS systems to operate in this band. Footnote NG104 currently limits GSO FSS earth station operations in this band to international systems.⁵ Loral requests that the Commission permit domestic GSO gateway operations in this band, subject to the qualifications proposed in these Comments. By permitting domestic GSO gateway operations at these frequencies, the Commission would enhance the network productivity and efficiency of existing and future GSO FSS operations licensed in this band and maximize use of scarce spectrum. In recent proceedings, the FCC has eliminated the distinction which existed between U.S.-licensed

³ NPRM at ¶ 14. The NPRM also proposes to allow NGSO user terminal uplinks in the 14.4-14.5 GHz portion of the band. Id. at ¶ 46.

⁴ Id. at ¶ 14.

⁵ Id. at ¶ 16.

domestic and international fixed satellite systems.⁶ Acknowledging this change and implementing it in this rulemaking is an efficient and transparent method to authorize domestic operations in this band.

To protect GSO FSS downlinks in this band from interference from NGSO operations, the NPRM supports use of the provisional epfd limits adopted at WRC-97. The Commission believes, “based primarily on studies carried out within the ITU-R, that the epfd levels needed to protect GSO FSS operations will not vary greatly from the WRC-97 provisional limits.”⁷ Loral respectfully submits that the final limits agreed to by WRC-2000 will have to take into account the short term and long term effects of multiple NGSO systems. Loral urges the Commission to carefully consider the limits ultimately adopted by WRC-2000, before it adopts limits in its rules.

The NPRM requests comment regarding NGSO sharing with GSO FSS large aperture earth stations. The goal of both GSO and NGSO operators should be to minimize the number of instances where specific coordination of individual stations becomes necessary. The JTG 4-9-11 meeting in January 1999 made progress in analyzing the impact of interference into large earth stations. During this meeting, steps were taken to collect information on the types and locations of such earth stations throughout the world and to conduct sensitivity analyses on the data obtained to understand the magnitude of the problem. Loral submits that it is premature to set any antenna size (or gain) thresholds for coordination until the proposed studies are completed. It is likely that, with additional information gained in these studies, parameters could be established that would eliminate the need for extensive coordination. In the few instances where individual

⁶ In re Amendment to the Commission's Regulatory Policies Governing Domestic Fixed Satellites and Separate International Satellite Systems, Report and Order, 11 FCC Rcd. 2429, at ¶ 34 (1996).

⁷ NPRM at ¶ 26.

coordination may prove to be necessary, Loral supports the approach (described in Section 3.1 of JTG 4-9-11/291-E) of adding footnotes to the Table of Frequency Allocations in Article S5 of the Radio Regulations, and utilization of procedures similar to those outlined in S9.11A of the Radio Regulations.

Loral agrees that protection should be extended to GSO FSS earth stations receiving signals from satellites in inclined orbit.⁸ Loral had previously advocated that GSOs in slightly inclined orbits with absolute value of inclination of $\leq 5^\circ$ be protected to the same level as GSOs with no inclination.⁹ Results at the January, 1999 JTG 4-9-11 meeting indicate that GSO receivers do not experience any significant increase in epfd working with satellites with absolute inclinations of up to 3° and that the epfd increases by about 3 dB for satellites with an inclination of 5° . Loral proposes that a reasonable goal (which balances the value of using existing satellites with the cost of keeping those satellites commercially viable) would be to provide safeguards necessary for the operation of GSOs with absolute inclination $\leq 4^\circ$ in most circumstances. Because inclined orbit satellites often provide services for ancillary and extended business operations, it may not be appropriate or reasonable to protect the most sensitive or extreme inclined orbit operations to the same extent that most inclined orbit services are protected. This approach could afford approximately five years of commercially viable operation in inclined orbit for most GSOs (assuming that the GSO starts with no inclination and drifts in the N-S direction at an average rate of 0.8° per year) without imposing the burdens of extreme cases on NGSOs. Moreover, before the FCC considers imposing limits, additional studies are needed to validate the

⁸ NPRM at ¶ 27.

⁹ JTG 4-9-11/79/E.

extent to which (if any) inclined orbit operations of GSO satellites are significantly affected by the proposed NGSO power flux density limits. These studies should also take into account the nature of the services that are likely to be provided by this type of GSO operation, in order to ensure that any limits are as narrowly tailored as possible.

Loral agrees that the impact of NGSO interference during GSO transfer orbit operations will be infrequent and of short duration.¹⁰ Loral supports the proposal that the affected GSO and NGSO licensees consult with one another to ensure successful deployment of the GSO spacecraft.¹¹ Loral believes that the epfd limits that will be adopted for the protection of normal communications over GSO satellites will also protect the normal telemetry downlink operations of such satellites.

The NPRM recognizes that it is essential to protect GSO operations from NGSO interference during satellite or launch malfunctions.¹² Loral supports the view, expressed in JTG 4-9-11/TEMP/42-E, that during emergency mode GSO operations (i.e., when the transmissions are to the GSO space station omni-directional antenna) the off-axis EIRP density of the GSO telecommand and ranging carriers be exempted from the limits contained in Art. S22. Since the ability to communicate with the GSO spacecraft in order to control it is critical even for normal mode operations, the off-axis EIRP of the GSO telecommand carriers should be allowed to exceed the limits contained in Art. S22 by up to X dB. The study groups will seek to determine the value of X based on further analysis.

¹⁰ NPRM at ¶ 29.

¹¹ Id.

¹² Id. at ¶ 31.

B. NGSO Gateway Uplink Band (12.75-13.25 GHz)

The NPRM proposes to permit NGSO FSS gateway uplink operations in the 12.75-13.25 GHz band and would amend footnote NG104 of the Table of Frequency Allocations to permit domestic NGSO FSS systems to operate in this band.¹³ GSO FSS earth station operations in this band are currently limited to international systems under footnote NG104.¹⁴ For the reasons set forth in Section II.A, supra, Loral requests that the Commission permit domestic GSO gateway operations in this band, subject to the qualifications proposed in these Comments.

To protect GSO FSS satellite receivers in the 12.75-13.25 GHz band from NGSO FSS earth station uplink interference, the NPRM supports the use of the provisional apfd limit of -170 dBW/m^2 adopted at WRC-97.¹⁵ Document JTG 4-9-11/TEMP/40 (Rev. 2)-E addresses the issue of apfd. Loral supports the proposals contained in that document. Specifically, Loral agrees that the WRC-97 provisional limit of -170 dBW/m^2 , measured in a 4 kHz reference bandwidth and not to be exceeded 100% of the time, would protect all existing GSO FSS satellites, including uplink command TT&C communications.

The Commission has sought comments on whether the apfd definition should take into account GSO satellite receive antenna directivity.¹⁶ Loral supports the proposals contained in Document JTG 4-9-11/TEMP/40 (Rev. 2)-E. Specifically, Loral supports the re-definition of the term apfd to epfd_{up} , and the inclusion of a GSO receive antenna reference pattern in the calculation of epfd_{up} . The inclusion of a reference pattern would not necessitate a change in the

13 Id. at ¶ 33.

14 Id.

15 Id. at ¶ 36.

16 Id. at ¶ 37.

epfd_{up} levels. For the reference pattern, Loral supports the use of the ITU-R S.672 format with a gain of 32.4 dBi, a sidelobe level of –20 dB, and a half-power beamwidth of 4°.

C. NGSO Gateway Uplink Band (13.75-14.0 GHz)

The NPRM proposes use of the 13.8-14.0 GHz band for NGSO FSS gateway uplinks and requests comments on issues relating to sharing by NSGO systems with GSO FSS uplinks.¹⁷ Loral supports this proposal subject to adoption by the Commission of the proposals contained in Document JTG 4-9-11/TEMP/40 (Rev. 2)-E addressing the issue of apfd. As indicated above, Loral agrees that the WRC-97 provisional limit of –170 dBW/m², measured in a 4 kHz reference bandwidth and not to be exceeded 100% of the time, would protect all existing GSO FSS satellites including uplink command TT&C communications. In addition, Loral supports the re-definition of the term apfd to epfd_{up}, and the inclusion of a reference GSO receive antenna reference pattern in the calculation of epfd_{up}. The inclusion of a reference pattern would not necessitate a change in the epfd_{up} levels. For the reference pattern, Loral supports the use of the ITU-R S.672 format with a gain of 32.4 dBi, a sidelobe level of –20 dB, and a half-power beamwidth of 4°.

D. NGSO Gateway Uplink Band (14.4-14.5 GHz)

The NPRM concludes that NGSO gateway uplink operations could share the 14.4-14.5 GHz band with GSO FSS uplinks.¹⁸ Loral supports such use subject to adoption by the Commission of the proposals contained in Document JTG 4-9-11/TEMP/40 (Rev. 2)-E addressing the issue of apfd. Loral agrees that the WRC-97 provisional limit of –170 dBW/m², measured in a 4 kHz reference bandwidth and not to be exceeded 100% of the time, would

¹⁷ Id. at ¶ 44.

¹⁸ Id. at ¶ 46.

protect all existing GSO FSS satellites including uplink command TT&C communications operating in this band. Loral also supports the re-definition of the term $apfd$ to $epfd_{up}$, and the inclusion of a GSO receive antenna reference pattern in the calculation of $epfd_{up}$. As noted above, the inclusion of a reference pattern would not require a change in the $epfd_{up}$ levels. Loral supports the use of the ITU-R S.672 format with a gain of 32.4 dBi, a sidelobe level of -20 dB, and a half-power beamwidth of 4° for the reference pattern.

The NPRM also requests comment as to whether NGSO user terminal uplinks should be permitted in the 14.4-14.5 GHz band.¹⁹ Loral submits that such use should be accommodated in this band subject to the proposals contained in these Comments. The only difference in the current spectrum allocations of the 14.0-14.4 GHz and 14.4-14.5 GHz portions of the band relates to secondary services; the primary allocations are the same.²⁰ Hence, as the FCC is proposing to allow use of NGSO service links in the 14.0-14.4 GHz portion of the band, it should also permit NGSO service links between 14.4-14.5 GHz.

III. NGSO FSS SERVICE LINK BANDS

The NPRM proposes to allow NGSO FSS service downlink operations in the 11.7-12.2 GHz band and in the 12.2-12.7 GHz band.²¹ It would also permit NGSO FSS service uplink operations in the 14.0-14.4 GHz band.²² Loral supports such use subject to the technical qualifications set forth below.

¹⁹ Id.

²⁰ Id. at ¶ 64.

²¹ Id. at ¶ 52.

²² Id.

A. NGSO Service Downlink Band (11.7-12.2 GHz)

The NPRM requests comment regarding NGSO sharing with GSO FSS large aperture earth stations.²³ Loral believes that the goal of both GSO operators and the NGSO operators should be to minimize the number of instances where specific coordination of individual stations becomes necessary. As stated above, the JTG 4-9-11 meeting in January, 1999 made progress in analyzing and understanding interference into large earth stations. Specifically, during this meeting steps were taken to collect information on the types and locations of such earth stations throughout the world and to conduct sensitivity analyses on the data obtained to understand the magnitude of the problem. Here, and in Section II.A, above, Loral argues that it is premature to set any antenna size (or gain) thresholds for coordination until the proposed studies are completed. With additional information gained in these studies, it is likely that parameters could be established that would eliminate the need for extensive coordination. In the few instances where individual coordination would be necessary, Loral supports adoption of a coordination procedure of adding footnotes to the Table of Frequency Allocations in Article S5 of the Radio Regulations (described in Section 3.1 of JTG 4-9-11/291-E), and utilization of procedures similar to those outlined in S9.11A of the Radio Regulations.

The NPRM requests information regarding sharing in these bands with inclined orbit GSO satellites.²⁴ In JTG 4-9-11, Loral has previously advocated that GSOs in slightly inclined orbits with absolute value of inclination of $\leq 5^\circ$ be protected to the same level as GSOs with no inclination.²⁵ As noted above in Section II.A, results presented at the January, 1999 JTG 4-9-11

²³ Id. at ¶ 54.

²⁴ Id.

²⁵ JTG 4-9-11/79/E.

meeting indicate that GSO receivers working with satellites with absolute inclinations of up to 3° do not experience any significant increase in epfd but that the epfd increases by about 3 dB for an inclination of 5°. In this proceeding, Loral proposes that a reasonable goal (which balances the value of using existing satellites with the cost of keeping those satellites commercially viable) would be to provide safeguards necessary for the operation of GSOs with absolute inclination $\leq 4^\circ$ in most circumstances. Because inclined orbit satellites often provide services for ancillary and extended business operations, it may not be appropriate or reasonable to protect the most sensitive or extreme inclined orbit operations to the same extent that most inclined orbit services are protected. This would afford approximately five years of commercially viable operation in inclined orbit for most GSOs (assuming that the GSO starts with no inclination and drifts in the N-S direction at an average rate of 0.8° per year) without imposing the burdens of extreme cases on NGSOs. Moreover, before the FCC considers imposing limits, additional studies are needed to validate the extent to which (if any) inclined orbit operations of GSO satellites are significantly affected by the proposed NGSO power flux density limits. These studies should also take into account the nature of the services that are likely to be provided by this type of GSO operation, in order to ensure that any limits are as narrowly tailored as possible.

The NPRM requests proposals regarding sharing with TT&C links.²⁶ In this band, as in the 10.7-11.7 GHz band, Loral agrees that the impact of NGSO interference during GSO transfer orbit operations would be infrequent and of short duration.²⁷ Loral also supports the NPRM's proposal that the affected GSO and NGSO licensees consult with each other to ensure a

²⁶ NPRM at ¶ 54.

²⁷ Id. ¶ 29.

successful deployment of the GSO spacecraft.²⁸ After examining the various JTG 4-9-11 contributions, Loral believes that the epfd limits that would be adopted for the protection of normal communications over the GSO satellites would also protect the normal telemetry downlink operations.

The NPRM recognizes that GSO operations must be protected from NGSO interference during satellite or launch malfunctions.²⁹ As in Section II.A, Loral supports the view of JTG 4-9-11 that during emergency mode GSO operations (i.e. when the transmissions are to the GSO space-station omni-directional antenna) the off-axis EIRP density of the GSO telecommand and ranging carriers be exempted from the limits contained in Art. S22.³⁰ Since the ability to communicate with the GSO spacecraft for controlling it is critical even for normal mode operations, the off-axis EIRP of the GSO telecommand carriers should be allowed to exceed the limits contained in Art. S22 by up to X dB. The study groups will seek to determine the value of X based on further analysis.

B. NGSO Service Uplink Band (14.0-14.4 GHz)

The NPRM proposes NGSO service uplink operations in the 14.0-14.4 GHz band.³¹ Loral agrees with the Commission that NGSO FSS user terminals could share this spectrum with GSO FSS uplinks subject to the establishment of appropriate sharing criteria.

For operations in this band, as in the 12.75-13.25 GHz, 13.75-14.0 GHz, and 14.4-14.5 GHz bands, Loral supports the proposals contained in Document JTG 4-9-11/TEMP/40 (Rev. 2)-

28 Id.

29 Id. at ¶ 31.

30 JTG 4-9-11/TEMP/42-E.

31 NPRM at ¶ 64.

E that address the issue of apfd. Loral agrees that the WRC-97 provisional limit of -170 dBW/m², measured in a 4 kHz reference bandwidth and not to be exceeded 100% of the time, would protect all existing GSO FSS satellites including uplink command TT&C communications. As noted, Loral also supports the re-definition of the term apfd to epfd_{up}, and the inclusion of a reference GSO receive antenna reference pattern in the calculation of epfd_{up}. The inclusion of a reference pattern would not necessitate a change in the epfd_{up} levels. For the reference pattern, Loral supports the use of the ITU-R S.672 format with a gain of 32.4 dBi, a sidelobe level of -20 dB, and a half-power beamwidth of 4°.

The NPRM proposes to give NGSO FSS operators the flexibility to implement NGSO FSS gateway uplink and user terminal uplink operations in the 14.2-14.4 GHz band.³² Loral recognizes that both user terminal and uplink gateway operations in the 14.2-14.4 GHz band will offer interference into GSO systems and that user terminals will be potentially more interfering. Loral supports user terminal and gateway uplink operations subject to the establishment of appropriate sharing criteria.

IV. SPECTRUM SHARING AMONG MULTIPLE NGSO SYSTEMS

A. Spectrum Sharing Among Multiple NGSO FSS Systems

The NPRM seeks comment on sharing among multiple NGSO FSS systems and proposes that "all NGSO FSS systems be responsible for some portion of the burden-sharing."³³ Specifically, the NPRM requests comment "on whether the potential NGSO FSS licensees that could be licensed as result of an initial processing round should have any responsibility for

³² Id. at ¶ 66.

³³ Id. at ¶ 70.

accommodating subsequent NGSO FSS applicants." ³⁴ Loral submits that a new NGSO system must "coordinate" with the NGSO systems that are already operational. As a result, the NGSO systems that follow the NGSO systems licensed in the initial processing round would have to use mitigation techniques that could affect capacity and cost. This mechanism would, of course, ultimately limit the number of commercially viable NGSO systems. It is not practicable for an NGSO licensee licensed in the first processing round to accommodate operations of subsequent NGSO licensees. Therefore, the Commission should not require NGSO licensees licensed in the first round to have any responsibility for accommodating operations of subsequent NGSO licensees. This approach is consistent with the current regulatory practice for GSO systems, *i.e.*, operating GSO systems do not have to make major adjustments for newly launched, nearby GSO systems.

B. Impact of Multiple NGSO FSS Systems on Sharing with Other Services

Multiple Ku-band NGSO satellite systems will likely be deployed. In response to the Commission's November 2, 1998 Public Notice establishing a cut-off date (January 8, 1999) for additional applications in the 10.7-12.7 GHz, 12.75-13.25 GHz, 13.75-14.5 GHz and 17.3-17.8 GHz bands, applications for NGSO systems that would operate in some portion of the Ku-band were received from Boeing, Teledesic, Hughes (2 applications) and Virtual Geosatellite LLC.³⁵

Loral believes that protection limits must take into account the effects of multiple NGSO systems. Such limits must afford sufficient protection to the GSOs without undue burden on the

³⁴ Id.

³⁵ Application of The Boeing Company, FCC File No. SAT-LOA-19990108-00006 (filed Jan. 8, 1999); Application of Teledesic LLC, FCC File No. SAT-LOA-19990108-00005 (filed Jan. 8, 1999); Application of Hughes Communications, Inc., FCC File No. SAT-LOA-19990108-00002 (filed Jan. 8, 1999); Application of Virtual Geosatellite, LLC, FCC File No. SAT-LOA-19990108-00007 (filed Jan. 8, 1999).

NGSOs. With respect to the maximum number of NGSO FSS systems that are "relevant" for determining sharing criteria, Loral notes that the January, 1999 JTG 4-9-11 meeting agreed to a compromise range of three to five. However, the studies presented at the October, 1998 meeting of the WP4A indicate that the NGSO/NGSO interference issue would limit this number to three for the NGSO systems to be commercially viable. Loral believes that the maximum number of NGSO systems should in fact be so limited to the number of systems that would be commercially viable. This issue will be considered further in the WP4A; the Commission's rules on this issue should await the outcome of the WP4A process.

The NPRM seeks comments on how the proposed sharing criteria should be applied or adjusted for multiple NGSO systems, i.e., the issue of aggregation.³⁶ It has been demonstrated by the study group analyses that there is a zone where the interference powers from multiple NGSO systems are additive and that there is a zone where the powers are not additive but the unavailability contributions add in time. The Commission should establish criteria that take into account these zones. For example, if the "relevant" number of first round NGSO systems is equal to N then:

- The long-term interference, which is power additive, should be allocated among the N NGSO systems;
- The short-term interference from all NGSO systems (aggregate) to a GSO network should be responsible for no more than 10% of the unavailability time in the GSO network and/or time allowances specified in the performance objectives of the GSO network. Thus, each NGSO system would contribute no more than $(10/N)$ % to the GSO unavailability;
- The aggregate interference should not lead to loss of synchronization in the GSO network of more than once per X days (the value of X to be determined in further studies) among the N NGSO systems.

³⁶ NPRM at ¶ 74.

V. OTHER TECHNICAL RULES

A. GSO Earth Station Off-Axis EIRP Density Limits

The FCC has proposed that all GSO earth stations comply with the modified ITU recommendation S.524 for off-axis eirp density limits.³⁷ These limits would apply in any direction within 3° of the GSO arc.³⁸ Loral believes that existing and future GSO FSS earth stations will have off-axis eirp density levels higher than those included in S22.26, S22.27 and S22.28. Loral supports an across-the-board 3 dB relaxation of the off-axis eirp density specifications contained in S22.26-22.28. These limits would apply for any off-axis angle greater than 2.5° or more from the main-lobe axis and not just along the GSO arc, as ITU-R S.254 implies. This view is consistent with what is recommended in the JTG 4-9-11/TEMP/47 (Rev. 2). The modified articles, which would replace the NPRM's proposed Section 25.204(g), would read:

- The level of equivalent isotropically radiated power (e.i.r.p.) emitted by an earth station shall not exceed the following values for any off-axis angle ϕ which is 2.5° or more off the main-lobe axis of an earth station antenna:

³⁷ Id. at ¶ 77.

³⁸ Id.

*Off-axis angle**Maximum e.i.r.p. density*
(dBW/40 kHz)

$2.5^\circ \leq \varphi \leq 7^\circ$	$39 - 25 \log \varphi + 3$
$7^\circ < \varphi \leq 9.2^\circ$	$18 + 3$
$9.2^\circ < \varphi \leq 48^\circ$	$42 - 25 \log \varphi + 3$
$48^\circ < \varphi \leq 180^\circ$	$0 + 3 \text{ dB}$

- For FM-TV emissions with energy dispersal, the limits above may be exceeded by up to 3 dB provided that the off-axis total e.i.r.p. of the transmitted FM-TV carrier does not exceed the following values:

*Off-axis angle**Maximum e.i.r.p. density*
(dBW/40 kHz)

$2.5^\circ \leq \varphi \leq 7^\circ$	$53 - 25 \log \varphi + 3$
$7^\circ < \varphi \leq 9.2^\circ$	$32 + 3$
$9.2^\circ < \varphi \leq 48^\circ$	$56 - 25 \log \varphi + 3$
$48^\circ < \varphi \leq 180^\circ$	$14 + 3$

- FM-TV carriers which operate without energy dispersal should be modulated at all times with program material or appropriate test patterns. In this case, the off-axis total e.i.r.p. of the emitted FM-TV carrier shall not exceed the following values:

*Off-axis angle**Maximum e.i.r.p. density*
(dBW/40 kHz)

$2.5^\circ \leq \varphi \leq 7^\circ$	$53 - 25 \log \varphi + 3$
$7^\circ < \varphi \leq 9.2^\circ$	$32 + 3$
$9.2^\circ < \varphi \leq 48^\circ$	$56 - 25 \log \varphi + 3$
$48^\circ < \varphi \leq 180^\circ$	$14 + 3$

These limits should not apply to earth station antennas for which a license has been issued or construction has begun and will be completed within the period authorized by the Commission. Nor should these limits apply to earth stations associated with satellites in the fixed satellite service for which complete coordination or notification information has been received by the ITU before June 2, 2000. Although the aforementioned proposal for off-axis eirp is three-dimensional

in nature, Loral recommends that GSO operators only be required to provide information in two orthogonal planes.

The antenna performance standards of Section 25.209(a)(1) and (2) will need to be modified to be consistent with the above proposal. Loral suggests that the Commission refrain from adopting rules on this issue until the various ITU working groups address the issue. Loral also suggests that the FCC establish a U.S. working group to address this matter.

B. Validation of pfd/epfd/apfd Limits

Loral supports the use, by the U.S., of a commonly accepted software tool, such as that being developed by the JTG 4-9-11, to ensure that any new NGSO FSS licensee meets the requisite pfd/epfd/apfd limits.³⁹ Loral believes that the appropriate set of NGSO system characteristics that should be furnished by the NGSO applicants are the ones necessary to run the JTG 4-9-11 software tool which will be adopted by the ITU and by the Commission.

VI. GLOBAL COVERAGE

Loral supports the Commission's proposal to adopt the same coverage area requirements for NGSO FSS systems operating in the Ku-band that it currently applies to the "Big LEO" systems operating in the 1610-1626.5/2483-2500 MHz frequency bands and the NGSO systems in the 17.7-20.2 GHz and 27.5-30.0 GHz frequency bands.⁴⁰ Because NGSO FSS systems are global in nature, it serves the public interest to adopt a coverage requirement to ensure "universal access throughout the U.S. and the world."⁴¹

³⁹ Id. at ¶ 80

⁴⁰ Id. at ¶ 84 (*citing Big LEO Report and Order*, 9 FCC Rcd. 536 (1994) at ¶ 24; 47 C.F.R. § 25.143(b)(2)(ii-iii); 28 GHz Third Report and Order, 12 FCC Rcd. 22310 at ¶ 34 (1997)).

⁴¹ 28 GHz Third Report and Order, at ¶ 34.

VII. CONCLUSION

The Commission has correctly recognized that NGSO FSS systems operating in the Ku-band must avoid causing unacceptable interference into existing GSO systems and not unduly constrain future growth of GSO FSS incumbent services. Loral requests that the Commission consider the alternative sharing criteria proposed in these Comments as well as the final conclusions of the study groups to permit NGSO FSS operations in certain segments of the Ku-band. For the foregoing reasons, Loral requests that the Commission adopt rules consistent with these Comments.

Respectfully submitted,

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March 2, 1999

ENGINEERING CERTIFICATION

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in these comments of Loral Space & Communications Ltd., in the NPRM ET Docket No. 98-206, that I have either prepared or reviewed the engineering information upon which they are based and that they are complete and accurate to the best of my knowledge.

Dated the 2nd day of March 1999

By: 

Sundaram G. Moorthy
Director, Spectrum
Development
Loral Skynet^{®1}

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